Redox Properties of Multiply-charged Fullerene Oligoadducts

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Oligoaddition to fullerenes has been widely used as a strategy for the fine-tuning of the electronic and chemical properties of the fullerene cage. Fulleropyrrolidines is an important class of stable fullerene derivatives, also characterized by the great stability of their reduced states [1]. In bis-adducts, the energetics of the first and subsequent reductions of such species can be effectively modulated by modifying the reciprocal position of the two addends (stereoisomerism). Besides, the corresponding fulleropyrrolidinium salts show increased electron-accepting properties and greater solubilities in polar organic solvents compared to their neutral parent compounds. Solubility was further increased by the introduction of additional positive charges in the lateral chains of the pirrolydinium groups, that make these compounds very soluble in polar solvents, including water. Applications of this class of fullerene derivatives in various fields of materials science and for biological applications will be discussed.

[1]Fullerenes. Chemistry, Physics, and Technology. (Eds K. M. Kadish, R. S. Ruoff), Wiley, New York, 2000; Fullerenes and Related Structures (Ed. A. Hirsch), Springer, Berlin, 1999; M. Prato, J. Mater. Chem. 1997, 7, 1097-1109.